

MSFC Telescience Support Center Capabilities Document

TSC-HDBK-001

September 2000

Baseline



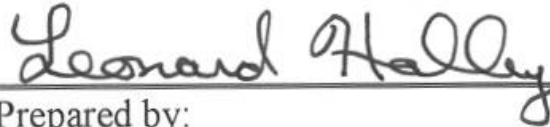
National Aeronautics and
Space Administration

Marshall Space Flight Center
Huntsville, Alabama

MSFC Telescience Support Center (TSC)
ISS Telescience Capabilities Document

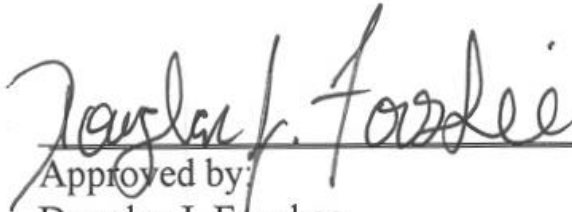
TSC-HDBK-001

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1.0 INTRODUCTION

The MSFC Telescience Support Center (TSC) provides a facility for Microgravity Material Science, Biotechnology, and Microgravity Glovebox engineers and scientists to perform payload operations activities. These activities include controlling onboard experiments, analyzing, processing and distributing science data, troubleshooting problems and training personnel. The TSC facility provides user connectivity to the Payload Operations and Integration Center (POIC) Data, Voice, and Video Systems to allow for coordination and cognizance of mission activities. The Microgravity Development Lab (MDL), (in Building 4493) houses the MSFC TSC. Figure 1-1 shows Building 4493. The TSC is located in three rooms in the East end. The TSC has two user rooms in 120 and 124. The equipment room is in 122. The High Bay / Clean Room in room 140, is also highlighted.

1.1 Scope

This document describes the initial capabilities and configuration of the TSC current with the date of release of the document. Future revisions will incorporate new capabilities as they are implemented.

1.2 Purpose

TSC requirements are driven by the International Space Station Program Office (ISSPO), the International Ground Segment Specification (IGSS) SSP-54500, the Payload Operations and Integration Facility (POIF) / Payload Operations and Integration Center (POIC), the Microgravity Research Program Office, the MSAD, the MSAD Disciplines and by the individual payload Developers. The purpose of this document is to describe the existing implementation of the TSC requirements. TSC systems provide a mechanism for users to access POIC Capabilities. For this reason, the TSC capabilities leverage off of POIC capabilities which are documented in the POIC Capabilities Document (PCD) SSP 50304.

This document also describes the configuration of the TSC facility. TSC requirements and capabilities are managed by the TSC Project Control Board.. New capabilities, upgrades and enhancements require submission of an Engineering Change Request (ECR) to the TSC Project Control Board for disposition. Once any TSC Requirement has been implemented, and added to the TSC Requirements Document, the corresponding capability will be added to this document.

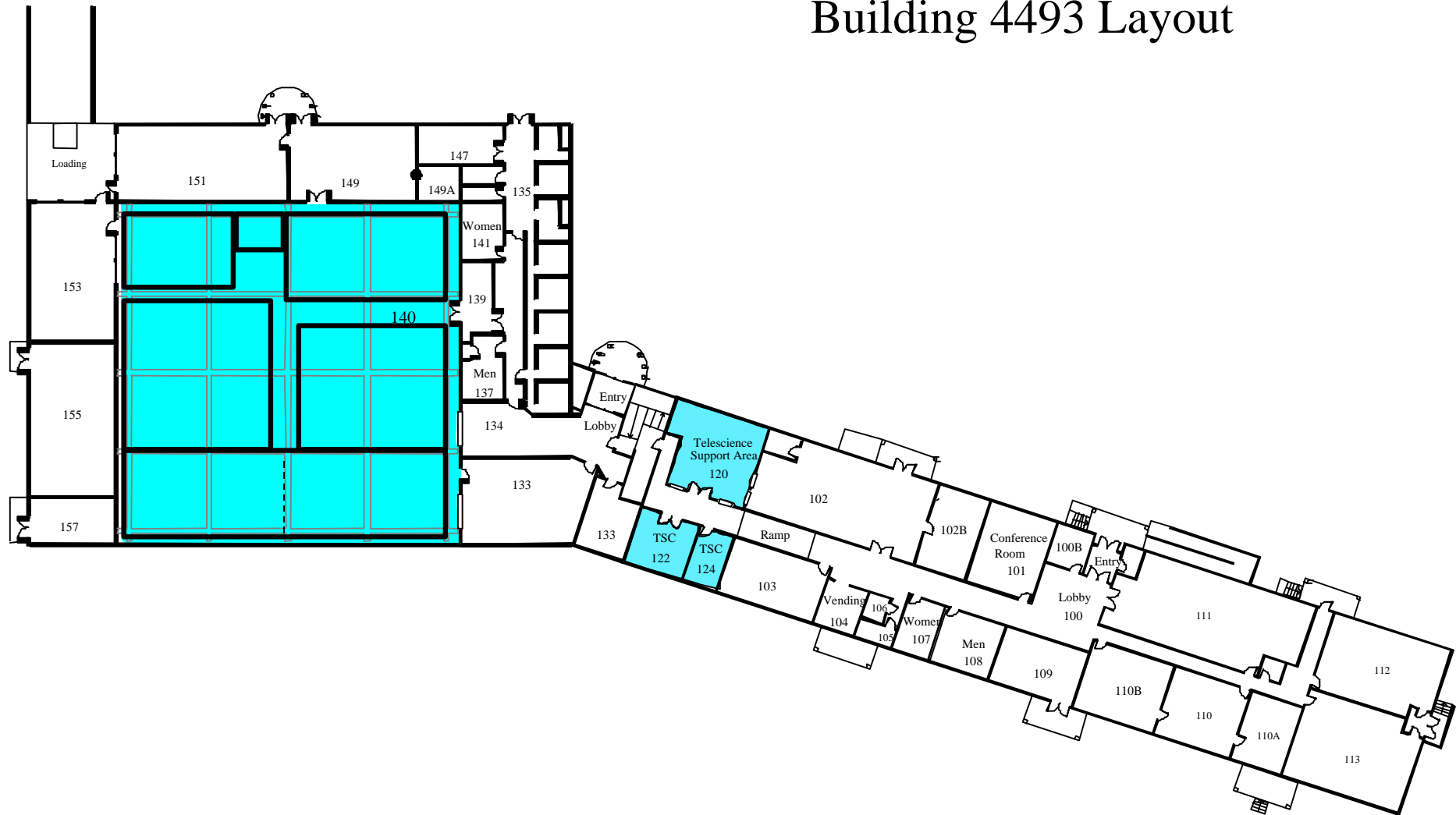
1.3 Costing Requirements for Payload Developers

The MSFC TSC is funded only to support MSFC MSAD Payload Developers (PD). PDs from other organizations wishing to use the MSFC TSC should first contact the MSFC TSC Manager before proceeding further. These PDs will be required to provide necessary funding to support all additional costs.

As stated above, this document represents the existing capabilities of the MSFC TSC. These existing capabilities are hereby referred to as the “standard services” for the MSFC TSC. The MSFC TSC will continue to upgrade its facilities, services, and capabilities for the MSAD users, as funding permits. Additional capabilities (non-standard services) desired by any PD, should be provided as inputs to the Ground Data Services data set. The TSC Integration Engineer will work with the TSC Manager to ensure that the capability or resource can be accommodated within the TSC budget. Any non-standard services (i.e., desired capabilities, additional resources, etc.) not covered by the TSC budget will require funding from the PD before implementation.

Figure 1-1 Building 4493 Microgravity Development Lab With TSC Highlighted

Microgravity Development Laboratory Building 4493 Layout



2.0 DOCUMENTS

2.1.1 Reference Documents

Reference documents are those documents that although not part of this document, serve to amplify or clarify its contents or dictate work policy or procedure.

- POIC Capabilities Document SSP-50304
- TSC Requirements Document TSC-RQMT-002
- MSFC Security Procedures and Guidelines MPG 1600.1
- Information Technology Security MPG 2810.1

2.1.2 Applicable Documents

Applicable documents are documents of the most current issue whose content to the extent specified herein are considered to form part of this document.

- International Ground Segment Specification SSP-54500
- POIC Generic User Interface Definition Document SSP-50305
- Enhanced Mission Communication System Requirements
MSFC-PLAN-2436
- Enhanced Mission Communication System Requirements
MSFC-PLAN-2437 (Vol 1-3)

3.0 TELESCIENCE SUPPORT CENTER

The TSC standard service/capabilities are divided into the following categories: facility related capabilities and communications capabilities. Facility capabilities are further broken down into physical characteristics and user consoles. Communications capabilities are broken down into voice, video, and network capabilities. While the TSC is providing network access to the POIC, it is not providing Data Services. Data display, distribution and manipulation within the TSC are the responsibility of the User organizations.

3.1 Facility physical characteristics

The physical characteristics include the following:

3.1.1 Facility

1. Physical Access - A locked door with a card reader provides physical access control to each TSC room within the MDL. Users requiring access need to contact the TSC project manager.
2. Floor Space – The operations room, simulation room and equipment room contain a total of 963 square feet.
3. Timing System – Timing displays are mounted on the walls in rooms 120, 124, 133, and 140. These displays are connected to the POIC Timing Distribution System (TDS) which is synchronized to the Global Positioning Satellite System (GPS). The wall clocks can show any TDS generated display, including Greenwich Mean Time (GMT) or a time particular to the current TSC event. The clock in each room is independently configurable.
4. Print Spooler – A print spooler is provided.
5. A standard PABX Telephone is provided at each console.

3.1.2 User Consoles

The initial console layout within the TSC rooms is shown in Figure 3-1. The console layout for the High Bay / Clean Room is shown in Figure 3-2. Figures 3-3, 3-4, and 3-5, show typical user console layouts of varying widths. For ease of discussion, within this document, the consoles in these figures will be referred to as Type 1, 2, and 3, accordingly. Each console is typically comprised of the following items:

1. Console Furniture – A desk, bookshelf and adjustable chairs are provided at each user console position.
2. Voice system keysets – A keyset is located on each user console. The keyset will provide access for up to 18 or 48 voice loops, depending on the configuration.
3. Monitors - One 13-inch color monitor is provided at each console.
4. Video Cassette Recorders (VCR)– A VCR is provided at each console position.
5. Printers – Laser printers, connected to the TSC Mission LAN, are provided at each console position.
6. Rotary Control Panel (RCP) – An RCP is provided at each position for the user to select from the TSC provided video channels.

7. Ground Support Equipment (GSE) Shelf/Rack – Space is provided to house user supplied GSE at each console, convenient to the workstation.
8. TSC Mission LAN Connection – One connector with a 100 Mbps connection to the TSC Mission LAN is provided at each console.

Appendix A describes the equipment allocation for each console within the TSC.

3.1.3 Miscellaneous Capabilities

This section describes the capabilities available to TSC users which are provided by the MDL Facility within Building 4493. These capabilities include:

1. Training – The TSC is responsible for training users on use of the keysets and RCP's. Use of the workstations and applications are the responsibility of the individual user organizations.

Figure 3-1 TSC Console Layout

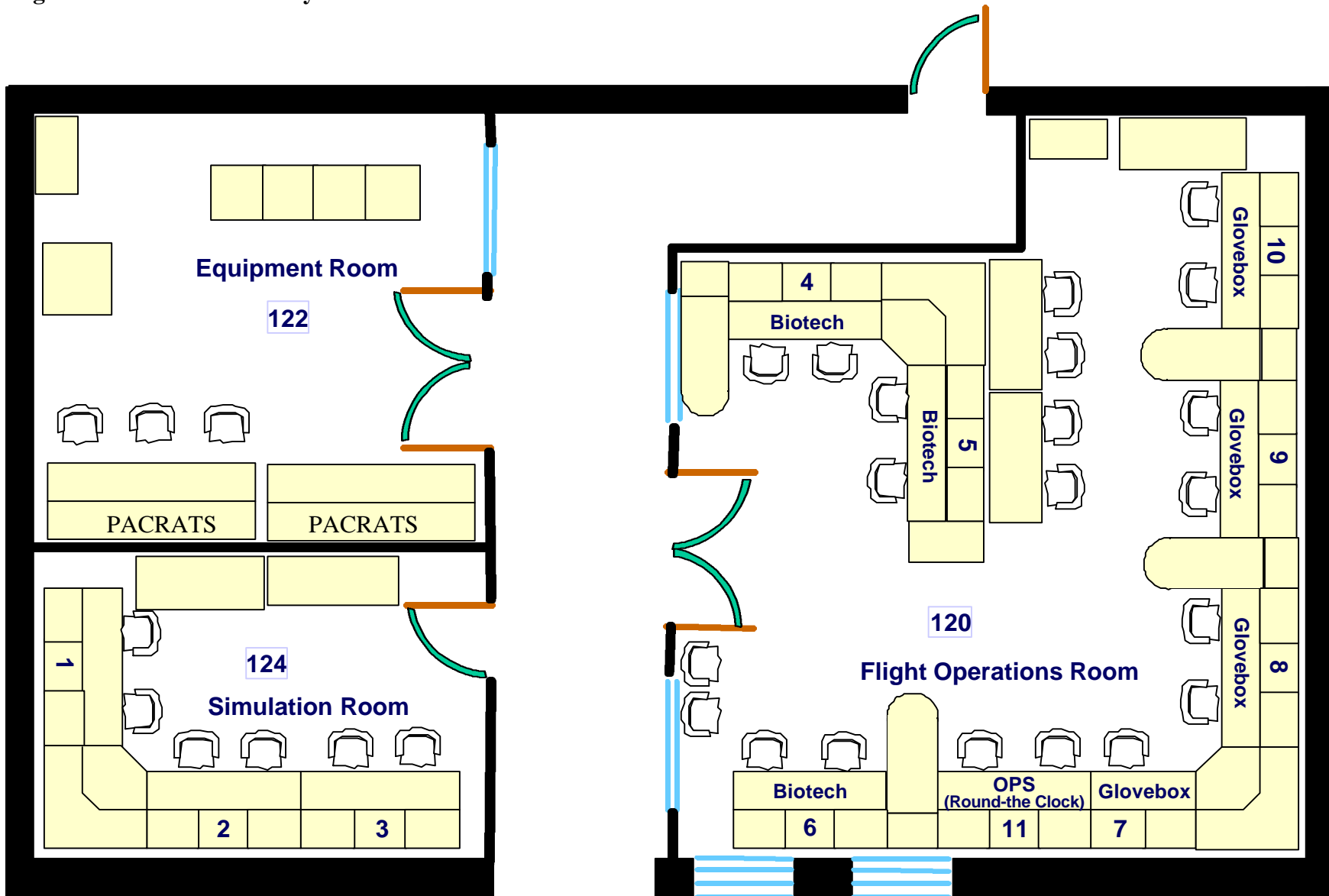


Figure 3-2 High Bay / Clean Room Layout

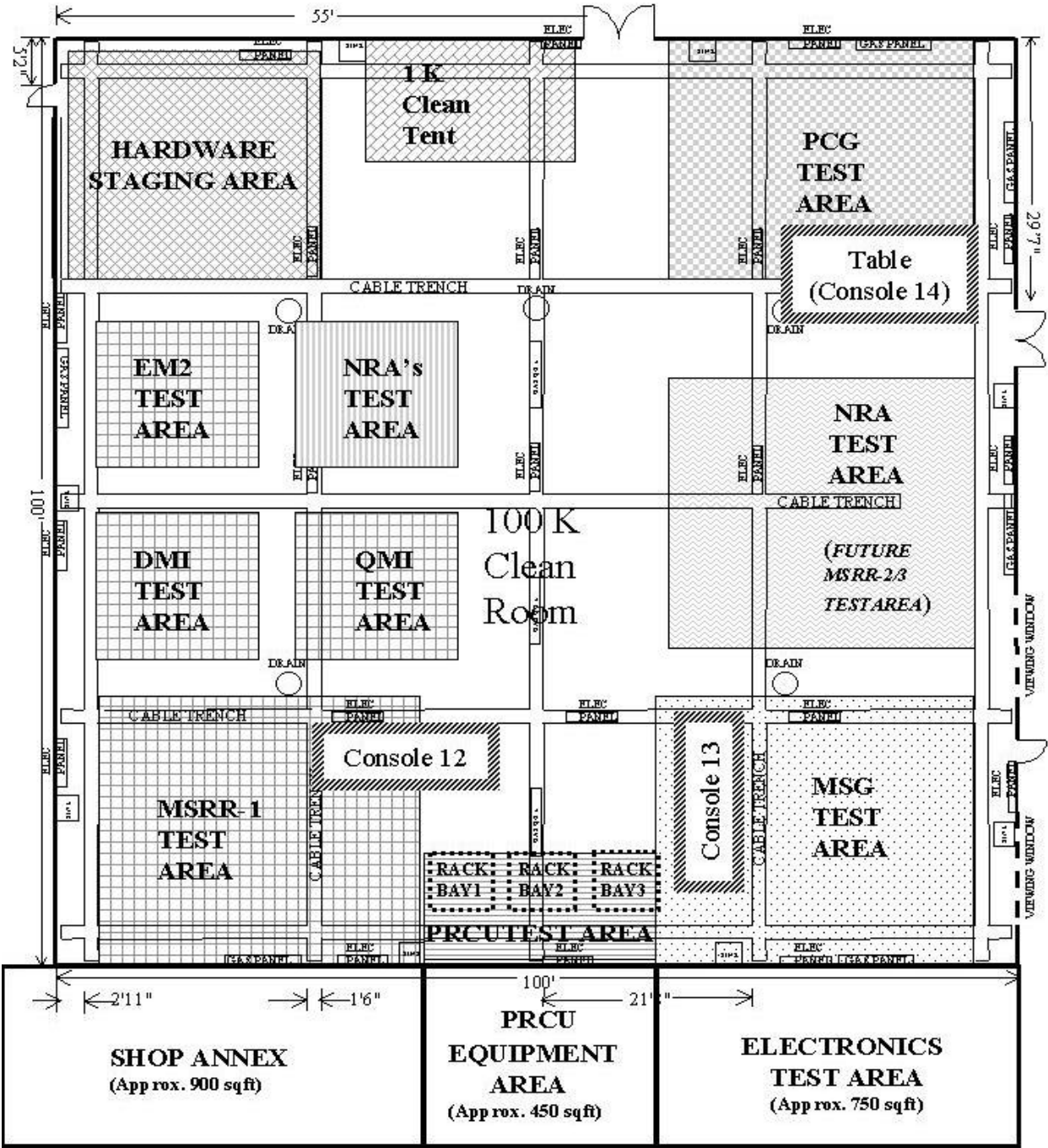


Figure 3-3 TSC User Console Layout (Type 1)

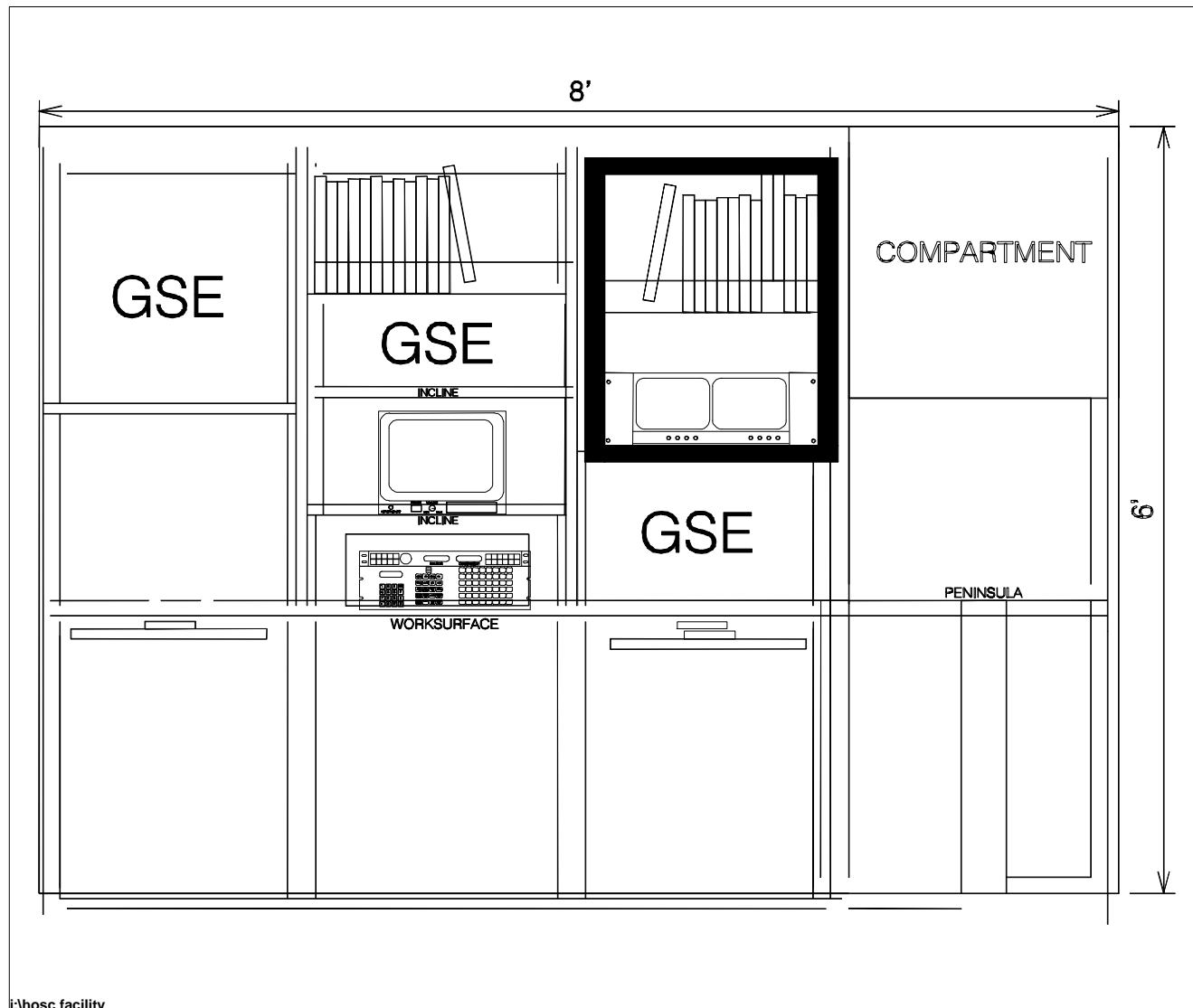


Figure 3-4 TSC User Console Layout (Type 2)

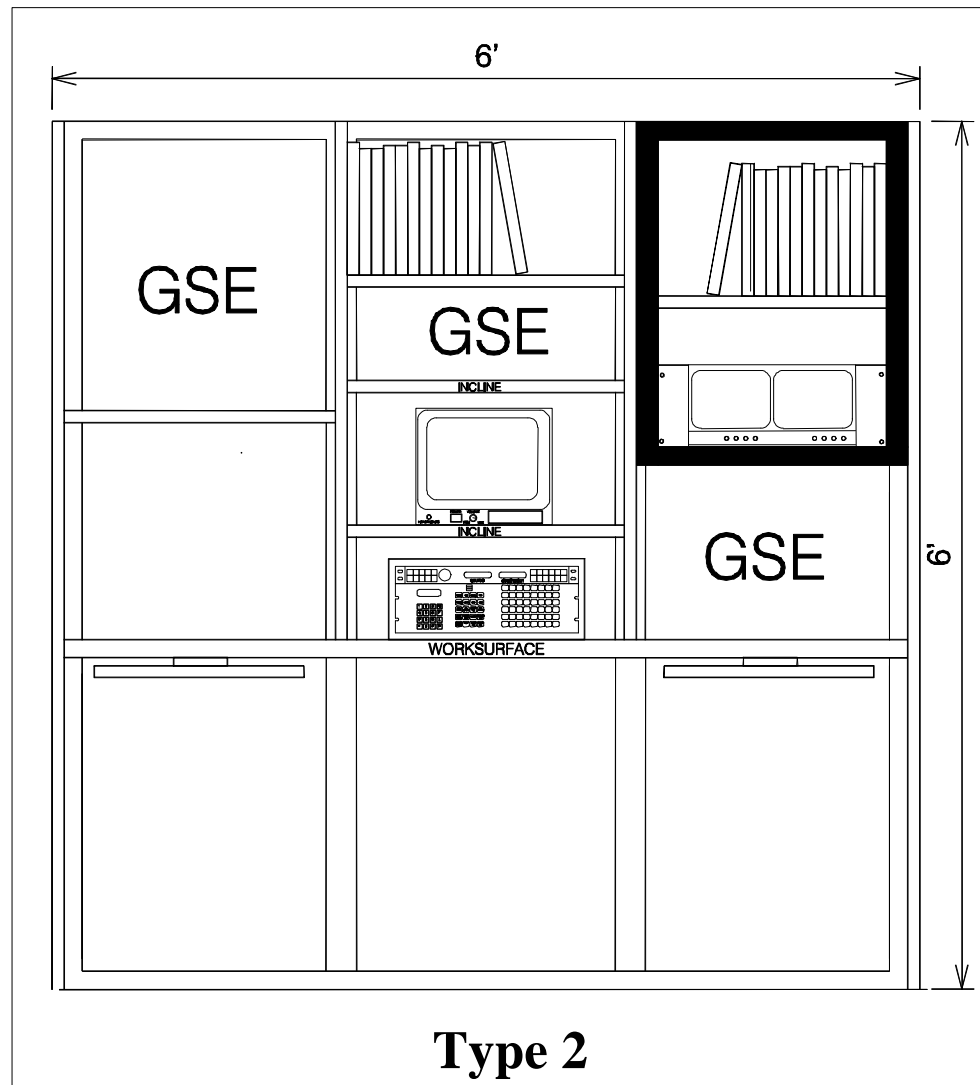
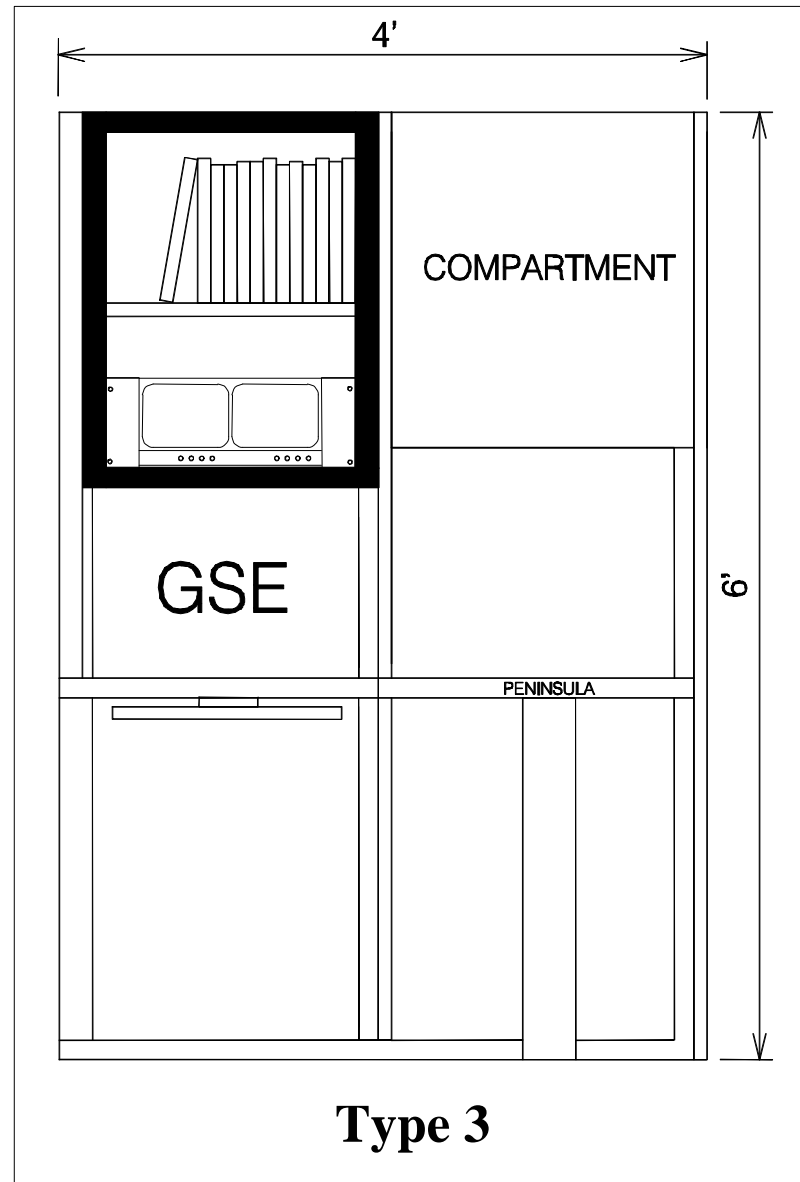


Figure 3-5 TSC User Console Layout (Type 3)



3.2 TSC Communication Capabilities

The TSC provides network, voice, and video communications to users within the TSC. This section describes these capabilities.

3.2.1 Network Communication Capabilities

3.2.1.1 TSC Mission Network

The TSC provides connectivity to the POIC, via the TSC Mission Network, so that workstations and user GSE can access the POIC data services, web applications, receive telemetry, and perform file transfers. A further description of POIC capabilities can be found in the POIC Capabilities Document (PCD) (SSP 50304). Pertinent network specifications are:

- 2 Network drops per console.
- Network bandwidth is 100 Megabits/sec.
- Standard connector for physical connectivity is an RJ45 Twisted Pair.
- Network provides connection to any attached GSE, POIC Services, and PDSS Ku-band downlink data distribution.

3.2.1.2 MSFC Institutional Area Network

The TSC provides one Institutional Area Network (IAN) drop at each user console.

3.2.1.3 Internet

Currently, outbound TCP connections from the MSFC TSC's Mission network to the Internet are allowed. Inbound as well as connectionless data are not allowed.

3.2.2 TSC Voice System

The TSC voice systems is an extension of the POIC voice system. This system provides communication capability for local and remote users. Each user position has a voice keyset with a capacity of up to 48 voice loops. The 48 loop capacity is achieved when a console is configured with a base keyset (18 loops) and an expansion box (additional 30 loops). The 48 loops are configurable from the loops available at the main voice switch. The TSC voice system provides local and remote voice loops for space-to-ground, air-to-ground and ground-to-ground communications. A description of available voice loops is listed in Appendix C of the PDL ground data services dataset (SSP 52000, Payload Data Sets (PDS)).

Within the TSC, the user may communicate with:

- Local TSC Users

External to the TSC, the user may communicate with:

- POIC Cadre
- Integrated Support Team (IST)
- Other NASA centers (e.g., JSC, Ames Research Center (ARC), Glenn Research Center (GRC), and Langley Research Center (LaRC))
- Remote facilities supporting Telescience activities
- Space-to-ground and/or air-to-ground voice loops (highly restricted)

Voice loop access in support of operations integration function activities are defined by the POIC Cadre and identified in the Payload Operations Handbook (POH). TSC customers will only be granted access to those loops required to support their payload operations activity.

3.2.2.1 Voice System Keysets

The keyset allows the user to select talk/monitor access to all configured voice loops. The TSC voice keysets have two configurations, a single keyset and a keyset with an expansion box. The keysets with an expansion box allows for access to a total of 48 voice loops.

The keysets in the TSC provide the following capabilities:

3.2.2.1.1 Maximum Voice Loops for each Instrument

The keyset provides users access to 48 approved conference loops. If the keyset has a telephone number, there will be a limit of 47 conference loops. Keysets in the High-Bay are currently limited to 18 voice loops.

3.2.2.1.2 Maximum Voice Loops Monitored Simultaneously

The Voice System Keysets allow users to monitor 48 voice loops simultaneously.

3.2.2.1.3 Commercial/Local Telephone Access

The keysets provide access to the MSFC phone system for commercial (local and long-distance) and Federal Telecommunication System (FTS) access on the 48th button of the instrument. The keyset provides the capability, if required, to connect an incoming Public Access Broadcast Exchange (PABX) call to a conference net. An approved teleconference can be set up on a conference loop via MSFC COMM Control. MSFC COMM Control can be reached at 544-6140.

3.2.2.1.4 Activity Indicators

Activity indicators on the keyset indicate the following conditions when the keyset is in service.

- A voice loop is configured to “monitor only” mode: solid green LED

- A voice loop selected for “talk/monitor” mode will display a solid green and solid red LED for as long as the loop is selected
- Activity detected on a voice loop: flashing red LED
- An incoming call on the commercial line: flashing green LED
- Muted voice loops: rapidly flashing green LED

3.2.2.1.5 Headsets/Handsets

All keysets have two headset/handset jacks. All keysets require Push-to-Talk (PTT) from either the headset or handset to enable/disable talk capability. Headsets with volume control are offered for use with the keysets.

3.2.2.1.6 Volume Control

The keyset provides volume control for either the individual loops or the headset/handset as required by the user.

3.2.2.1.7 Mass Mute Capability

The keyset provides mass mute capability that allows the user to mute all monitor only loops selected so that the talk/monitor loop selected can be heard more easily.

3.2.2.1.8 Master Release

The keyset provides a master release capability that allows the user to release all currently selected monitor only loops.

3.2.2.1.9 Individual Loop Enable/Disable

The keyset provides the capability to enable and disable up to 48 voice loops individually. Only one of these loops can be selected to be talk/monitor.

3.2.2.1.10 Additional Keyset Features

Additional keyset features include:

- Last number redial
- Recall dialing
- Speed dialing
- Hold

3.2.2.2 Space-to-Ground and Air-to-Ground Voice Capabilities

The voice system keyset provides talk/monitor capability on the space-to-ground and air-to-ground voice loops. User positions with this access privilege must be predefined. The POIC Cadre will enable talk access in real-time when required.

3.2.3 TSC Video System

Like the voice system, the TSC video system is an extension of the POIC video system. The video system receives and distributes video signals to support payload operations within the TSC. The video system provides video monitoring of Mission Video Services, NASA TV, and the Weather Channel.

The TSC video system is directly connected to the POIC video distribution switch. From this switch 10 video channels are forwarded to the TSC. Of the 10 channels, a maximum of 5 can originate in the HOSC. One TSC channel can be fed back to the switch.

Within the TSC, the video system can distribute 16 video channels originating inside the TSC. These inputs can be any user provided source or the VCR's. This video can be distributed to any of the other monitors which are connected to the TSC Video Matrix. One of these video channels can be forwarded to the POIC Video Matrix for distribution to the HOSC or any other applicable site.

3.2.3.1 External POIC Video Sources

This section describes the external video signals available to the TSC.

3.2.3.1.1 ISS Downlink Video

The TSC receives the four ISS Downlink Video channels from the Building 4207 Annex, which are available for distribution to the monitors within the TSC.

3.2.3.2 Standard Video Displays

The standard video displays are provided at a user console and consist of one 13" (National Television Standards Committee (NTSC) compatible color monitor, and a video selector panel (Rotary Control Panel (RCP)). The selector panel provides source selection and 10 programmable keys which can be user programmed for instant channel selection.

3.2.3.2.1 Video Recording and Playback

VHS format recorders are available at each console position for video recording and playback through the video matrix. Known recording requirements must be coordinated through the Ground Support Requirements Team (GSRT) and indicated in the PDL. The users are responsible for the operation of the video recorders and handling of the video tapes.

3.2.3.2.2 GSE Video Interfaces

The TSC video system provides a video interface to GSE. Users are responsible for providing the appropriate interface cable. The specifications of the cable are described in the PGUIDD, Section 3.2.2.

3.3 Operational services

This section addresses the services which will be provided to the TSC. These services are provided as function of the POIC Integrated Support Team (IST). For further reference, refer to the PCD (SSP 50304) Section 12, as these services are applicable to the MSFC TSC.

3.3.1 Facility Services

1. The TSC is accessible for operations 24 hours a day and seven days a week.
2. The TSC can support a minimum of two independent, simultaneous, on-line operations. The limitation will be based on the number of consoles and voice loops required for the requested activities.

3.3.2 Network Services

1. Equipment Failure / Recovery – There are two 24 port Ethernet switches in the MSFC TSC. One should act as a prime and the other is a backup. If the primary switch should fail, the drop cables will require manual relocation to the other switch.

3.3.3 Voice Services

1. Equipment Replacement – a failed voice instrument or headset will be returned to service within one hour of notification of the failure, on a 24x7 basis.

3.3.4 Video Services

1. Restoration of Operation – restoration of inoperative end user video monitors or rotary control panels will be accomplished within one hour of the failure, on a 24x7 basis.

APPENDIX A. TSC CONSOLE EQUIPMENT ALLOCATION

Console Number	User	Room Number	Console Type *	Keysets	Monitors 13"	Comment
1	Simulation Console	124	2	Keyset w/ expansion box	1	
2	Simulation Console	124	2	Keyset w/ expansion box	1	
3	Simulation Console	124	2	Keyset w/ expansion box	1	
4	Biotechnology	120	1	Keyset w/ expansion box	1	
5	Biotechnology	120	2	Keyset w/ expansion box	1	
6	Biotechnology	120	2	Keyset w/ expansion box	1	
7	Glovebox	120	3	Keyset w/ expansion box	1	
8	Glovebox	120	2	Keyset w/ expansion box	1	
9	Glovebox	120	1	Keyset w/ expansion box	1	
10	Glovebox	120	1	Keyset w/ expansion box	1	
11	Operations Console	120	3	Keyset w/ expansion box	1	
12	MSRR-1 Test Area	140		Keyset		
13	MSG Test Area	140		Keyset		
14	PCG Test Area	140	Table	Keyset		

The numbers used in the Console Type column refer to the console width as shown in Figures 3-3, 3-4 and 3-5

APPENDIX B. ITEMS TO BE DETERMINED AND RESOLVED.

TBD'S

TBR'S